DRAFT

Engineering Evaluation
USDA Agricultural Research Center, Plant # 1855
800 Buchanan Street, Albany, CA 94710
Application # 10690

BACKGROUND

The applicant, USDA Agricultural Research Center in Albany, has applied to install a new, emergency back-up generator. The new Diesel driven generator is:

S-13 Emergency Diesel Generator, Cummins 125DGDK, 207 BHP

The Emergency Diesel Engine Generator Set (S-13) is equipped with the best available control technology (BACT) for minimizing the release of air borne criteria pollutants and harmful air toxins due to fuel combustion. The criteria pollutants are nitrogen oxides (NOx), carbon monoxide (CO), precursor organic compounds (POC) from unburned diesel fuel, sulfur dioxide (SO_2) and particulate matter (PM10). All of these pollutants are briefly discussed on the District's web site at baaqmd.gov.

The engine has a control module, turbocharger, charge air cooler and direct Diesel fuel injection. The engine, S-13, meets the Environmental Protection Agency and California Air Resources Board (EPA/CARB) Tier 2 Mobile Off-Highway standard. The engine will burn commercially available California low sulfur Diesel fuel. The sulfur content of the Diesel fuel will not exceed 0.05% by weight. The operation of this engine, S-13, should not pose any health threat to the surrounding community or the public at large.

EMISSIONS CALCULATIONS

The S-1 Diesel Engine has been certified by CARB to be a cleaner burning engine. Except for SO_2, the emission factors for this engine are from the CARB Certification (CARB Executive Order # U-R-002-0249), summarized as follows:

NOx + HC:	6.4 gm/kw-hr x .7457 kw/hp = 4.77 gm/hp-hr
CO	0.8 gm/kw-hr x .7457 kw/hp = 0.60 gm/Bhp-hr
PM	0.17 gm/kw-hr x .7457 kw/hp = 0.13 gm/Bhp-hr

Tier 2 engines use a combined NOx + HC specification. Based on District guidelines, 100% of this specification is used for a NOx emission factor and 3% of this specification is used for the POC emission factor. The SO_2 emission factor of 0.00205 lb SO_2/Bhp-hr is from AP-42, Fifth edition, Table 3.3-1 (0.00205 lb/Bhp-hr x 453.6 gm/lb = 0.930 gm/Bhp-hr). The applicant has requested that the engine be permitted for 50 hours annually for maintenance and reliability purposes.

The emission calculations are as follows:

Hours of Operation = 50 hr/yr (1/2 hour per week plus 24 extra hours for troubleshooting)

Fuel Consumption = 10.2 gal/hr
Estimated Fuel Usage = 10.2 gal/hr X 50 hr/yr = 510 gal/yr.
Engine power = 207 BHP

NOx = 4.77 gm/bhp-hr (207 hp)(1 lb/453.6 gm)(50 hr/yr) = 108.8 lb/yr or 0.054 TPY

CO = 0.60 gm/bhp-hr (207 hp)(1 lb/453.6 gm)(50 hr/yr) = 13.7 lb/yr or 0.007 TPY

POC = (4.77)(.03) gm/bhp-hr (207 hp)(1 lb/453.6 gm)(50 hr/yr) = 3.27 lb/yr or 0.002 TPY

PM10 = 0.13 gm/bhp-hr (207 hp)(1 lb/453.6 gm)(50 hr/yr) = 2.97 lb/yr or 0.001 TPY

SO_2 = (0.00205 lb/bhp-hr)(207 hp)(50 hr/yr) = 21.2 lb/yr or 0.011 TPY

Summary of S-13 Diesel Engine Emissions

Pollutant	Emission Factor (gm/Bhp-hr)	Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Cumulative Increase (Ton/yr)
Nitrogen Oxides	4.77	1.09	108.8	0.054
Carbon Monoxide	0.60	0.14	13.7	0.007
POC	0.143	0.03	3.27	0.002
PM-10	0.13	0.03	2.97	0.001
Sulfur Dioxide	0.930	0.21	21.2	0.011

Daily emissions = EF * 207 HP * 0.5 hr/day / 453.6 gm/lb. Annual emissions based on 50hr/yr.

PLANT CUMULATIVE EMISSIONS

The plant cumulative emissions in tons/yr are summarized below. Total hydrocarbons in the engine exhaust are assumed to be all POC emissions.

Summary of S-13 Cumulative Emissions

	Current	Increase (S-13)	Total
Pollutant	Ton/year	Ton/year	Ton/year
NOx	0.834	0.054	0.888
CO	0.505	0.007	0.512
POC	0.131	0.002	0.133
PM10	0.141	0.001	0.142
SOx	0.011	0.011	0.022

TOXICS RISK SCREENING ANALYSIS

This application required a Toxics Risk Screening because the Diesel particulate emissions are greater than the toxic trigger level.

Toxic Pollutant Emitted	Emission Rate for S-13 (lb/yr)	Risk Screening Trigger (lb/yr)
PM 10 (Diesel Particulate)	2.97	0.6

S-13 does meet Best Available Control Technology for toxics (TBACT) since the Diesel particulate emissions are less than 0.15 gm/bhp-hr. For an engine that meets the TBACT requirement, it must also pass the toxic risk screening level of less than ten in a million. The cancer risk is conservative. It assumes a constant exposure of the ultra sensitive population (young people, the elderly, and the infirm, etc.) at 24 hours for a 70 years life.

This emergency generator passed the Health Risk Screening Analysis (HRA) conducted on October 1, 2004 by the District's Toxic Evaluation Section. The source poses no significant toxic risk, since the risks to the maximally exposed receptors are 2.6 in a million. The level of risk for students at Oceanview Elementary and MacGregor High School, assuming the weekly engine testing and periodic troubleshooting is done weekdays during school hours, is 4.6 in a million. Thus, in accordance with the District's Risk Management Policy, the risk screen passes since the engine meets the TBACT requirement of 0.1 gm/BHP-hr limitation for particulate emission (the 0.13 gm/BHP-hr PM10 emission factor for S-13 is acceptable because it rounds down to 0.1 gm/BHP-hr).

OFFSETS

Total facility emissions, including this project, will be less than 15 tons per year of POC and NOx. Therefore, in accordance with Regulation 2-2-302, Offsets do not apply.

BACT/TBACT

The engine emits less than 10 lbs/day of all criteria pollutants based on a ½ -hour operating day for maintenance/reliability operations. However, for the purposes of a Best Available Control Technology (BACT) determination, emissions due to a 24 hr/day operation need to be considered. Based on the worst case 24 hr/day operation, the emissions are as summarized below:

Pollutant	Emission Factor (gm/BHP-hr)	Daily Emissions (lb/day)	BACT(2) (gm/BHP-hr)
Nitrogen Oxides	4.77	52.2	6.90
Carbon Monoxide	0.60	6.57	2.75
POC	0.143	1.57	1.50
PM-10	0.13	1.42	0.10

Sulfur Dioxide	0.930	10.2	Low Sulfur Diesel

Daily emissions = EF * 207 HP * 24 hr/day / 453.6 g/lb.

S-13 triggers BACT since the emission rate of NOx and SO_2 from this source are more than 10 pounds of emission per highest day per Regulation 2-2-301. The use of a Selective Catalytic Reduction (SCR) System to meet BACT(1) for NOx is not required because it is not cost effective for a unit that will be used only during emergency and reliability-related activities. Source S-13 will comply with BACT(2) for NOx because it is CARB certified at the level below the BACT(2) requirements. Compliance with BACT(2) for SO2 is achieved by using commercially available Diesel fuel with a sulfur content not to exceed 0.05 wt% sulfur. BACT(2) requirements are shown above and can be found on the District's web site under BACT/TBACT Handbook, Section 2 – Combustion Sources for I.C. Engine – Compression Ignition > 175 HP, Document # 96.1.2 (http://www.baaqmd.gov/pmt/bactworkbook/96-1-2.htm).

STATEMENT OF COMPLIANCE

Source S-13 is subject to and expected to be in compliance with the requirements of District Regulation 1-301 "Public Nuisance", District Regulation 6 "Particulate Matter and Visible Emissions", Regulation 9-8 "NOx and CO from Stationary Internal Combustion Engines" and Regulation 9-1 "Sulfur Dioxide". In order to ensure compliance with the requirements of these regulations, the facility will be conditionally permitted to meet the requirements.

This project is considered to be ministerial under the District's CEQA Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.

The project is within 1000 feet of the nearest school and therefore the owner/operator is subject to the public notification requirements of Reg. 2-1-412. A public notice was prepared and sent to:

All addresses within ¼ mile of the Diesel generator.
Parents and guardians of students at Oceanview Elementary School.
Parents and guardians of students at MacGregor High School.

S-13 is subject to and in compliance with the requirements of Regulation 9-8-330, Emergency Standby Engine, Hours of Operation. The owner/operator has requested 50 hours per year for maintenance and reliability operations.

A Best Available Control Technology (BACT) review is required for any new or modified source that results in a cumulative emissions increase for POC, NPOC, NOx, SO_2, PM10, or CO of greater than 10 pounds per highest day. S-13 will exceed the 10 pounds limit for NO_x and SO_2 when operated for a 24-hour period. A BACT analysis indicates that this engine complies with the District BACT2 Standard, which is acceptable under the District's policy for emergency standby generators.

A toxic risk screen was performed for the PM10 engine emissions, and was found to be in compliance with the District's Risk Management Policy.

Prevention of Significant Deterioration (PSD), New Source Performance Standards (NSPS), Offsets and National Emissions Standards for Hazardous Air Pollutants (NESHAPs) do not apply to this application.

PERMIT CONDITIONS

This application will use the standard permit condition number 19533, modified only to reflect the 50 hrs/yr annual operation for maintenance operability purposes:

CONDITIONS FOR NON "ESSENTIAL" EMERGENCY ENGINES:

Stationary Equipment Requirements

1. Hours of Operation: The owner/operator shall operate the emergency standby engine(s) only to mitigate emergency conditions or for reliability-related activities. Operating while mitigating emergency conditions is unlimited. Operating for reliability-related activities is limited to 50 hours per any calendar year. [Basis: Cumulative Increase]

   "Emergency Conditions" is defined as any of the following:
   a. Loss of regular natural gas supply.
   b. Failure of regular electric power supply.
   c. Flood mitigation.
   d. Sewage overflow mitigation.
   e. Fire.
   f. Failure of a primary motor, but only for such time as needed to repair or replace the primary motor.

   [Basis: Regulation 9-8-231]

   "Reliability-related activities" is defined as any of the following:
   a. Operation of an emergency standby engine to test its ability to perform for an emergency use, or
   b. Operation of an emergency standby engine during maintenance of a primary motor.

   [Basis: Regulation 9-8-232]

2. The owner/operator shall equip the emergency standby engine(s) with either:
   a. a non-resettable totalizing meter that measures the hours of operation for the engine; or
   b. a non-resettable fuel usage meter, the maximum hourly fuel rate shall be used to convert fuel usage to hours of operation.

   [Basis: Regulation 9-8-530]

3. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 2 years and shall make the log available

```
for District inspection upon request:
   a.   Hours of operation (total).
   b.   Hours of operation (emergency).
   c.   For each emergency, the nature of the emergency
        condition.
   d.   Fuel usage for engine(s) if a non-resettable
        fuel usage meter is utilized.
[Basis: Regulations 9-8-530 and 1-441]
```

EXEMPTIONS

None.

RECOMMENDATIONS

It is recommended that an Authority to Construct be waived and a Permit to Operate be issued to USDA Agricultural Research Center for:

S-13 Emergency Diesel Generator, Cummins 125DGDK, 207 BHP

by: _____ Date: _____

Arthur P. Valla
Air Quality Engineer II
Engineering Division